African Invertebrates Vol. 46 Pages 93–101 Pietermaritzburg December, 2005

A revision of the species of the *Proandricus marenzelleri* species-group with new synonyms (Oligochaeta: Microchaetidae)

by

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ABSTRACT

The species of Microchaetidae that have constituted the *Proandricus marenzelleri* species-group are revised, following study of the material housed at ZMUH, NHM and SAMC, and new specimens in the collection of the Natal Museum. *P. marenzelleri* (Rosa, 1897) is redescribed; *P. algoensis* (Rosa, 1897) and *P. humicultor* (Michaelsen, 1910) are relegated to synonymy of *P. marenzelleri*, while *P. mirificus* (Plisko, 1993) is confirmed as a valid species. The status of *P. brincki* (Sciacchitano, 1960) is uncertain. The species-group is redescribed, and its distribution is reassessed.

KEY WORDS: Oligochaeta, Clitellata, Microchaetidae, *Proandricus*, *marenzelleri*, *algoensis*, *humicultor, mirificus, brincki*, taxonomy, revision, synonyms, South Africa.

INTRODUCTION

In my earlier studies of the South Afrcan Microchaetidae, the proandric species *P. marenzelleri* (Rosa, 1897), *P. algoensis* (Rosa, 1897), *P. humicultor* (Michaelsen, 1910), *P. brincki* (Sciacchitano, 1960) and *P. mirificus* (Plisko, 1993) were considered to be valid, and were united in the *P. marenzelleri* species-group (Plisko 1993, 2000, 2002, 2003). However, study of the material of *marenzelleri, algoensis* and *humicultor* gathered in the collections of the ZMUH, NHM and SAMC, as well the study of new material collected in Eastern Cape and Free State provinces, revealed the need to revise the status of these species. It is now evident that *algoensis* and *humicultor* (the latter was described as a variation of *Microchaetus modestus* Michaelsen, 1899) are junior synonyms of *marenzelleri*, whereas *mirificus* is confirmed to be a valid species. The status of *brincki* is uncertain. Information on morphological features of the group is extended and the variability of certain features is described. Specific constant anatomical and morphological characters are summarised. The unusual geographical distribution of the species-group is discussed (Fig. 1).

MATERIAL AND METHODS

The following material was examined: the material of *P. marenzelleri* (Rosa, 1897) and *P. algoensis* (Rosa, 1897), housed in the ZMUH and NHM; three samples identified by Pickford (1975) as *marenzelleri*, in SAMC; specimens originally named by Michaelsen as *Microchaetus modestus* Michaelsen, 1899 var. *humicultor* Michaelsen, 1910, in ZMUH. Thirty-three microchaetid samples assigned to the *P. marenzelleri* species-group from the Natal Museum collection were re-examined. Data derived from specimen labels are given in quotation marks. Earlier published data on collection sites (Michaelsen 1899*a*, 1900, 1910–1912, 1918; Pickford 1975; Plisko 1993; Rosa 1897) are marked with an asterisk and, when possible, the co-ordinates have been added in square brackets. Morphological and anatomical terminology, assignment to species-groups, and species distribution, follow previous publications (Plisko 1993, 1996, 2002, 2003).

The following abbreviations are used:

cl	–	clitellate
juv	–	juvenile
KZN	–	KwaZulu-Natal
NHM	–	Natural History Museum in Vienna, Austria
NMSA	–	Natal Museum, Pietermaritzburg, South Africa
SAMC	–	South African Museum, Cape Town
ZMUH	–	Zoologisches Institut und Zoologisches Museum der Universität, Hamburg, Germany

TAXONOMY

The *P. marenzelleri* species-group

Fifty-one species assigned to the genus *Proandricus* Plisko, 1992 were allocated to eight species-groups: the *belli*, *colletti, lesothoensis*, *marenzelleri*, *marleyi, sirgelli*, *timmianus* and *warreni* groups (Plisko 1993, 2000, 2002). The species *P. marenzelleri* (Rosa, 1897), *P. algoensis* (Rosa, 1897), *P. humicultor* (Michaelsen, 1910), *P. mirificus* Plisko, 1993, and *P. brincki* (Sciacchitano, 1960) were assigned to the *P. marenzelleri* species-group (Plisko 2000). These species are characterised by the spermathecal pores occurring in intersegmental furrows 12/13 and 13/14 and by three thickened septa 4/5, 7/8, 8/9. *P. brincki* was included in this group, although it had been recorded as having thickened septa 10/11 and 11/12 (see comments).

Proandricus marenzelleri (Rosa, 1897)

Microchaeta marenzelleri Rosa, 1897: 2; Michaelsen 1899*a*: 107; 1899*b*: 416; Reynolds & Cook 1976: 133. (*Locus typicus*: Algoa Bay)

Microchaetus marenzelleri: Michaelsen 1900: 450; 1913: 541; 1918: 312, 327; Pickford 1975: 58.

Microchaeta algoensis Rosa, 1897: 3; Michaelsen 1899*a*: 108. (*Locus typicus*: Algoa Bay). **Syn. n.**

Microchaetus algoensis: Michaelsen 1900: 450; 1913: 541; 1918: 312, 327; Pickford 1975: 58.

Microscolex algoensis: Reynold & Cook 1976: 67 [*lapsus*: *Microscolex* for *Microchaeta*].

Microchaetus modestus Michaelsen, 1899 var. *humicultor* Michaelsen, 1910: 82; Michaelsen 1918: 329; Pickford 1975: 58; Reynolds 1976: 115 [erroneous information: *typus amissus*] (*Locus typicus*: Fouriesburg, Free State). **Syn. n.**

Proandricus marenzelleri: Plisko 1992: 355; 1993: 214; 2000: 259; 2003: 293.

Proandricus algoensis: Plisko 2000: 259; 2003: 293.

Proandricus humicultor (Michaelsen, 1912): Plisko 1992: 355 [*lapsus*: 1912 for 1910].

Proandricus humicultor: Plisko 2003: 293.

Diagnosis: 103 mm long, 3 mm wide at tubercula pubertatis. Glandular swellings anterior to male pores on 14/15, male pores in intersegmental furrow 15/16. Clitellum on 12–22. Tubercula pubertatis on 16–18. Papillae on 10, 11, 18–21 in setal lines *c*. Thickened septa: 4/5 thickest, 7/8 and 8/9 less than anterior. Typhlosole commences in 19. One pair of male funnels in 10, enclosed. One pair of vesiculae seminales in 11. Spermathecae near septa 12/13 and 13/14, one pair per segment; tubular, slightly curved or bent. Genital glands in 18–21, variable in shape and size.

Redescription:

External features: Body cylindrical. In life, grey or pinkish-grey, usually not pigmented, but in moist biotopes sometimes slightly pigmented dorsally on anterior segments; yellowish-grey when preserved in alcohol. Body 52–168 mm long, 3–4 mm wide at segment 10 (only one specimen 182 mm long, 5 mm wide at segment 10). *Segment number*: 140–265. *Prostomium*: prolobous, small, fused with first segment. *Segmentation*: secondary annulation present on preclitellar segments; 1 and 2 simple, with irregular longitudinal grooves; 3 simple; 4–9 with two simple ringlets, posterior usually shorter than anterior; 10, 11 and clitellar simple, similar in size; postclitellar randomly annulated. *Setae*: minute, closely paired, in regular rows in majority of specimens. However, when papillae are shifted laterally or medially, setae are also relocated. *Nephridial pores*: conspicuous, at the anterior margins of segments near intersegmental furrows, in setal lines *cd*; first pair in intersegmental furrow 3/4. *Male pores*: in 15/16, at margins of ventral borders of tubercula pubertatis; glandular swellings precede male pores on 14 and 15, with deep, medial grooves in intersegmental furrow 14/15. *Female pores*: in 14 between *b–c* setae. *Spermathecal pores*: obvious, in intersegmental furrow 12/13 and 13/14.

Clitellar region: *Clitellum*: saddle-shaped, segmented, yellowish-grey, or white; on 1/n11,12–21,22; occasionally extending on 11 or 23. Anterior and posterior borders well marked; laterally clitellar tissues extending to *ab* setae. *Tubercula pubertatis*: oblong ridges, segmented; on 16–18,1/n19,19, preceded by glandular swellings on segments 14–15; separated from clitellum by thickened tissues. *Genital papillae*: very variable in size, number and position, occurring on preclitellar and clitellar segments; linked with *ab* setae; located in regular setal lines or shifted laterally or medially. Paired or single, may be coupled with genital glands or rise separately.

Internal characters: *Septa*: 4/5 heavily thickened, muscular, strong, although its thickness may vary; 5/6 and 6/7 not thickened, thin; 7/8 and 8/9 always thickened less than 4/5; 9/10 and other septa thin. *Gizzard*: in 7, well developed, globular, muscular. *Calciferous glands*: in 9–10, separated dorsally and ventrally. *Intestine*: originating in 13. *Typhlosole*: commencing in the area of 19–20, terminates in region of two thirds of number of segments. *Dorsal blood vessel*: 5–9 double tubes, simple when crossing septa, close together, partly or entirely separated within segment; in 8 separated, in 9 cordiform; in 10 and following segments enlarged, simple. *Paired dorsoventral vessels*: 5–8 thin vessels, 9–11 enlarged, moniliform. *Nephridia*: many-branched coiled loops, with extended, V-shaped, elongated caeca. *Male funnels*: proandric arrangement; one pair of funnels, enclosed in sac closely connected posteriorly at septum 10/11 with seminal sacs; in majority of dissected individuals iridescent, confirming presence of sperm. *Vasa deferentia*: single tube extending to segment 15, entering body wall posteriorly in 15, and male pores in intersegmental furrow 15/16. *Seminal vesicles*: one pair, swollen sacks, commencing at septum 10/11 extending into 11. *Ovaries*: fan-shaped, large. *Spermathecae*: in segment 12 and 13; one pair per segment; occasionally one spermatheca missing; very seldom two spermathecae at one side of segment. Occasional presence of two ampullae at one side or reduction of one ampulla may be local variation, or simple anomaly indicating regeneration of injured segments. Variable size and shape: club-shaped, tubular, U-, J-, S-shaped, occasionally deeply embedded in wall tissue, often iridescent. *Genital glands*: variable in size, shape, number and position; paired or single; flat or elongated, simple or composed of multiple glands; may occur independently or be associated with genital papillae.

Material:

The following collections housed in ZMUH, NHM, SAMC and NMSA were studied, and observation data are used for the species redescription.

Material housed in ZMUH: *Eastern Cape*: 'V.1759. *Microchaetus marenzelleri* Rosa, Port Elizabeth [33°58'S:25°40'E], Kaplands, Brauns'; two specimens, previously dissected, dried, brittle, presently not available for dissection; this is probably the material studied by Rosa and Michaelsen. The sample labelled 'V.5127. *Microchaetus marenzelleri* Rosa, Kapland, Brauns, Port Elizabeth' contains one specimen. Michaelsen probably examined this one, because in this dissected specimen the calciferous glands and some internal organs are missing. I examined and compared it with the other available species material. 'V.5125. *Microchaetus algoensis* Rosa, Port Elizabeth, Kaplands, Brauns'contains twenty decomposed specimens. I have examined two of them, previously dissected although less decomposed. *Free State*: 'V.3307. *Microchaetus modestus* Mich. var. *humicultor* Mich. Kellner, Orange Col. Fouriesburg [28°38'S:28°15'E]'; this sample contains 22 intact specimens, in various states of maturity, and 19 abscised postclitellarly and decomposed specimens. This sample contains probable syntypes, as Michaelsen (1910: 82) describing *humicultor* wrote: '*Vorliegend ca 40 geschlechtsreife und mehrere unreife order halbreife Exemplare*'. I have examined two that were dissected, with missing internal parts of segments 10–17, and one intact, dissected by myself.

Material housed in NHM: '*Microchaetus algoensis* (R) Coll. Musei Vindobonensis, Inv. No 4810, Algoa Bay, leg. Penter, AN. 15244 = *Microchaeta algoensis* Rosa'; two specimens, well preserved, dissected, probably studied by Rosa and Michaelsen, and examined by myself.

The examination was impeded by the very poor condition of the examined specimens and the absence of internal organs from preclitellar segments. However, the position of the clitellum and spermathecal pores, location of papillae, the thickness of septa, and the number of spermathecae, could be ascertained. No data on other internal organs were obtainable.

The material examined by Pickford, housed in SAMC: *Western Cape*: 'Knysna District, Cape Province: Belvedere, Knysna [34°01'S:23°03'E]; bank of pond not far from beach, in damp rather sandy soil at depth of about 1 ft, below grass roots, G.E. Pickford, Dec. 24. 1926(2), SAMA21548'. 'Uniondale District, Cape Province: Avontuur [33°34'S:23°10'E] earth below turf near locality 10, G.E. Pickford, Jan. 6. 1927(3), SAMA21547'. *Eastern Cape*: 'Humansdorp [34°01'S:24°45'E] district, Cape Province: Witte Els Bosch, in peaty soil, damp area of rather open veld below Damant's farm; G.E. Pickford, Jan. 11. 1927 (2), SAMA21547'.

New material examined: *Free State*: 14 km NE of Ficksburg (28°53'S:27°53'E), alt. 1850 m, indigenous bush, dry soil, 7.xii.1991, JDP & A. Zicsi, 1cl + 5 juv, all in aestivation NMSA/Olig.01195. *Eastern Cape*: 4 km north of Barkly Pass (31°14'S:27°49'E), alt. approx. 2000 m, 25.i.1990, JDP & BRS, grassland, between roots of various plants, black, moist soil, 1 cl NMSA/Olig.00605 and 6 cl + 8 juv NMSA/Olig.00610; on the bank of local stream, black, moist, or saturated soil, 1cl + 1 semimature NMSA/Olig.00607 & NMSA/Olig.00551. 26 km N of Umtata (31°35'S: 28°48'E), beside N2, grassland, on bank of local stream, moist soil, 17.i.1990, JDP & BRS, 2 cl + 14 juv NMSA/Olig.00503. 3 km SW of Stutterheim (32°32'S:27°29'E), alt. approx. 700 m, on the bank of Kubusi River, grassland, between roots of various plants, 20.xi.1991, JDP & A. Zicsi, 16 cl + 12 juv NMSA/Olig.01114, 13 cl + 2 cl much larger than other congeners + 2 juv NMSA/Olig.01111 and NMSA/Olig.01110. 16 km SW of Stutterheim following R358, alt. approx. 1000 m, Westpointon farm, 19.i.1990, JDP & BRS: pine forest planted 26 years ago on primary grassland, in 1–15 cm of dry soil, 3 cl + 1 juv NMSA/Olig.00526; on the bank of stream, moist, not saturated soil, and under rotten bark, 4 cl + 3 juv NMSA/Olig.00537 and 1 cl + 2 juv NMSA/Olig.00532; indigenous grassland, moist soil, 20.xi.1991, JDP & A. Zicsi, 13 cl + 33 juv NMSA/Olig.01103. 30 km SE of Stutterheim, alt. approx. 350 m, ditch near road, dry rocky soil, 21.xi.1991, A. Zicsi, 3 cl (with spermatophores) + 13 semimature NMSA/Olig.01121 & NMSA/Olig.01119. 6 km SW of Stutterheim, alt. approx. 750 m, Kologha Forest, black moist soil, 20.i.1991, JDP & A. Zicsi, 5 cl + 5 juv, NMSA/Olig.01117. 22 km SW of Stutterheim, Mr Schwarz farm, on the bank of the stream, moist soil, 20.xi.1991, JDP & A. Zicsi, 1 cl NMSA/Olig.01108. Kei Road (32°42'S:27°37'E) beside R348, grassland and bush, dry soil, 18.i.1990, JDP & BRS, 1 cl + 3 juv NMSA/Olig.00511, 4 semimature + 3 juv NMSA/Olig.00513, 9 cl + 5 juv NMSA/Olig.00519. Pirie Forestry (32°45'S:27°20'E), 7.xi.1990, JDP: on bank of the dam, at 20 cm depth, moist soil, 8 cl + 5 juv NMSA/Olig.00681, and 5 semimature NMSA/Olig.00682; primary grassland, dug out by the bulldozer, 14 cl + 5 juv NMSA/Olig.00671. Debe Nek (32°48'S:27°12'E), primary grassland, on bank of small natural pool, 7.xi.1990, JDP, 5 cl + 1 juv, associated with *Proandricus ianthinos* Plisko, 1993, and in close neighborhood of *Proandricus skeadi* Plisko, 1993, NMSA/Olig.00670. Middledrift (32°48'S:27°01'E), 26 km W of King William's Town, along R63, grassland, dry soil, 20.i.1990, JDP & BRS, 4 cl , associated with *Proandricus skeadi*, NMSA/Olig.00555. 5 km SW of Grahamstown (33°20'S:26°31'E), indigenous forest, near small stream, 22.xi.1991, JDP & A. Zicsi, 7 cl + 9 juv NMSA/Olig.01140. 35 km from Port Elizabeth (33°58'S:25°40'E), ditch near road, very dry soil, 24.xi.1991, JDP & A. Zicsi, 9 cl in aestivation, associated with *Proandricus zicsi* Plisko, 1993, NMSA/Olig.01141.

Published records: *Eastern Cape*: Rosa (1897): *Algoa Bay [35°50'S:25°45'E]; Michaelsen (1899*a*,1900) reported after Rosa, and new site noted by H. Brauns: *Port Elizabeth [33°58'S:25°40'E]; Pickford (1975): one site in *Humansdorp [34°01'S:24°45'E] area. *Western Cape*: Pickford (1975): six sites in the area of *Knysna [34°01'S:23°03'E]; two sites in the area of *Avontuur [33°34'S:23°10'E]. *Free State*: Michaelsen (1910–1912) *Fouriesburg [28°38'S:28°15'E].

Comments: The inadequate original descriptions of *P. marenzelleri* and *P. algoensis* left their systematic position doubtful for decades. The type locality indicated for *marenzelleri* and *algoensis* as Algoa Bay suggested that both species had been collected in the Port Elizabeth district, in the province now known as Eastern Cape. Pickford (1975) had not seen the type material, but examined many specimens characterised by features attributed to *marenzelleri, algoensis* and *humicultor* and collected across a wide range of places in Eastern Cape. During thorough examination, she noted numerous variations in the external characters accredited to these three species, observing at the same time that the internal anatomical characters were constant and in accordance with the original description of *marenzelleri*. In conclusion, she considered that *algoensis* and *humicultor* may be synonyms of *marenzelleri*, and published a redescription of the species (Pickford 1975). However, an apparent *lapsus* regarding thickness of the septa, a major species character, occurred. It was stated that: '... septum 4/5 is strongly thickened, 8/9 and 9/10 moderately so, but the intervening septa (5/6, 6/7 and 7/8) are thin'. In all specimens from the collection of the South African Museum, dissected previously by Pickford and examined by myself, the septum 4/5 is most thickened, 7/8 and 8/9 are thickened less, 5/6, 6/7 and 9/10 are always thin, and this character is in accordance with Rosa's description of *marenzelleri*, who wrote: '... *I dissepiment* 4–5, 7–8 *e* 8–9 *sono inspessiti, gli intermedii* 5–6 e 6–7 *sono sottili ed incompleti*'.

Michaelsen (1910–1912) describing var. *humicultor* assigned specimens with spermathecal pores in intersegmental furrows 12/13 and 13/14 to *Microchaetus modestus* Michaelsen, 1899, the species having spermathecal pores in 11/12 and 12/13. Although not having seen the original material, Pickford (1975) noted the discordance in description and suggested separation of *humicultor* from *modestus.* At the same time, Pickford assumed their synonymy, after observing its similarity with *marenzelleri* and *algoensis* in an extended study on internal and external characters, with special consideration of the position of the male pores, distribution of papillae and setae in large populations of *marenzelleri, algoensis,* and *humicultor*. Present examination of the material of *marenzelleri*, *algoensis* and *humicultor* housed in ZMUH, NHM, SAMC and NMSA confirms that these three species are clearly synonyms. Having page precedence, *P. marenzelleri* (Rosa, 1897) is a senior synonym.

Constant morphological and anatomical characters are: proandric condition (male funnels in 10, enclosed); the openings of vasa deferentia into male pores in intersegmental furrow 15/16; glandular swellings anterior to male pores on 14/15; the number and location of spermathecae and their ectal pores in intersegmental furrows 12/13 and 13/14; thickened septa: 4/5 the most, 7/8 and 8/9 less than anterior; well developed gizzard in segment 7; origination of intestine in 13; origination of typhlosole in the area of 19–20. Moderate variability of following characters has been observed: clitellum on 11,1/n11,12–21,22,23; tubercula pubertatis on 16–18,1/n19,19; occasionally one spermatheca reduced or an extra one appears. The following features are highly variable: body size; number of segments; location of setae; size, shape, location of genital papillae; size, shape and location of genital glands.

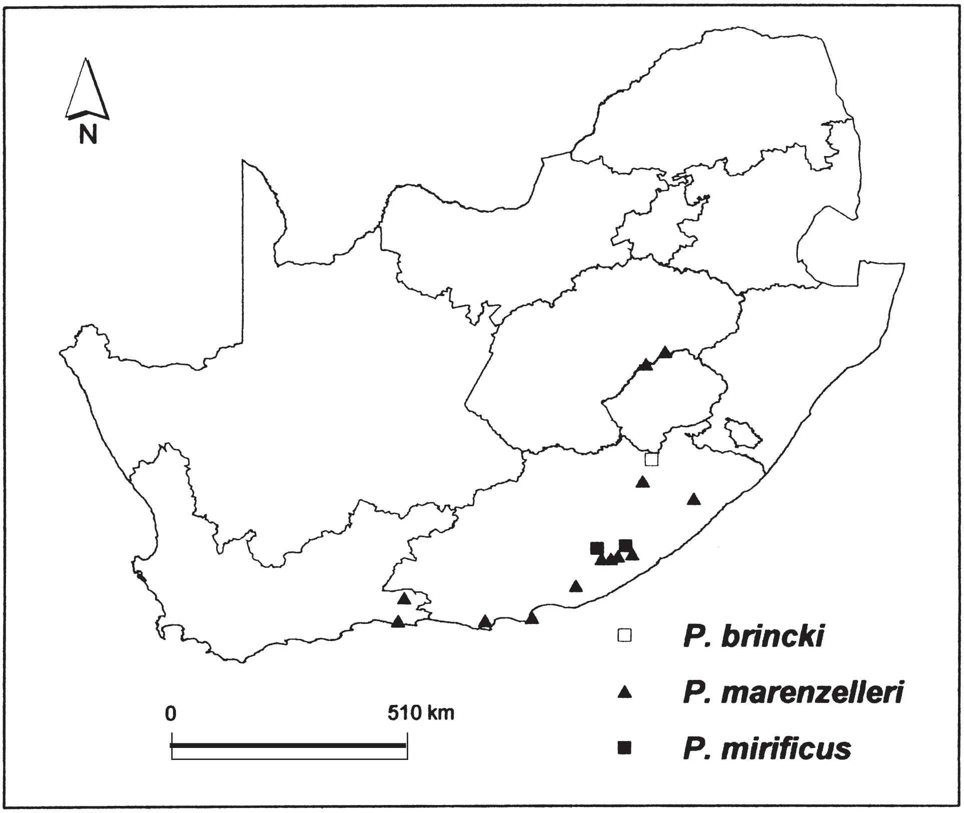

Fig. 1. Distribution of species of *Proandricus marenzelleri* species-group.

Biology and distribution: This species is known from a wide variety of habitats: undisturbed, indigenous and cultivated grasslands, stream banks, various types of soil in forests, plantations, bushveld, cultivated farmlands and gardens. It has been recorded in dry, moist and saturated soils, in litter, under logs and stones.

It is usually active throughout year, but in two cases was found in aestivation.

This species is indigenous to South Africa, although it occurs more widely than is known for other microchaetids. It was noted from Free State, Western Cape and Eastern Cape (Fig. 1).

Proandricus mirificus Plisko, 1993

Proandricus mirificus Plisko, 1993: 214; Plisko 2000: 259; 2003: 293.

Holotype: NMSA/Olig.00533, **Eastern Cape*, 16 km SW of Stutterheim (32°32'S:27°29'E), alt. approx. 1000 m, in the bank of local stream under rotten bark, 19.i.1990, JDP & BRS. [re-examined]
New material examined: *Eastern Cape*: 16 km W of Hogsback (32°35'S:26°56'E), grassland, very dry soil, 22.i.1990, JDP & BRS, 2 cl + 2 juv, NMSA/Olig.00591.

Comments: *P. mirificus* shows strong similarity with *marenzelleri*, but is regarded here as a valid species. A much shorter clitellum, septum 4/5 thickened less than the posterior thickened septa, a pair of very large male funnels commencing in segment 10 and clearly extending to segment 11, distinguish this species from congeners. A review of the type material and study of individuals collected in a new site confirm assignment of this species to the *marenzelleri* species-group. This species is known from three separated sites, all in Eastern Cape.

Proandricus brincki (Sciacchitano, 1960)

Microchaetus brincki Sciacchitano, 1960: 11.
Proandricus brincki: Plisko 1992: 354; 1993: 214; 2000: 259; 2003: 293.

Comments: No material of this species was available for examination. The original description is confusing; probably the record of thickened septa 10/11 and 11/12 is a *lapsus*. The lack of any further similar records suggests that the given data may be erroneous. No other proandric species is known to have thickened septa 10/11 and 11/12. The proandric condition and the location of spermathecal pores in 12/13 and 13/14, however, do suggest that the species may be allocated to the *marenzelleri* species-group, but until the type material is studied more fully, even the validity of the species rank is uncertain. However, while new material from the type locality is required, the *locus typicus* 'Drakensberg, 8 miles ENE Rhodes [30°48'S:28°0'E], alt. 8500 ft.' is close to Barkly Pass [31°14'S:27°49'E], the area where the new samples of *marenzelleri* were collected, and the possibility exists that *brincki* may be a junior synonym.

DISCUSSION

A comprehensive study of *P. marenzelleri*, *P. algoensis* and *P. humicultor*, based on the type material and augmented by new material, now confirms that *algoensis* and *humicultor* are junior synonyms of *P. marenzelleri* (Rosa, 1897). However, the range of examined material, besides revealing constant specific characters, also demonstrates large intraspecific variation. The wide variation in the body size and segment number, the high variability in shape and location of genital papillae and genital glands, and occasionally observed intensity of pigmentation in individuals living in moist biotopes, suggest that *marenzelleri* is probably the most morphologically diverse species in the genus *Proandricus*. The shape and location of genital papillae and genital glands were noted when the species was described, and were the main basis for attributing the species rank. The results of the present study together with Pickford's (1975) data, considerably extend knowledge of morphological diversity, and permit assessment of the validity of this species. The constant proandric condition, the consistent location of male pores in intersegmental furrow 15/16 with glandular swellings located anterior to male pores on 14–15, the location of spermathecal pores in 12/13 and 13/14, and thickness of septa 4/5, 7/8 and 8/9, establish the species identity. In contrast, considerable variability in the arrangement of the genital papillae and genital glands was observed even in closely located populations. It was also noted that *marenzelleri* occurs frequently in large populations, unlike other microchaetids, which occur consistently in small numbers in specific biotopes. It is possible that this variability can be due to more prolific reproduction and the generation of large populations. It should be noted that a similar observation could be made about *P. modestus* (Michaelsen, 1899), a species attributed to the *belli* species-group. These species differ in the position of spermathecal pores, which in the latter species are located in the intersegmental furrows 11/12 and 12/13, i.e. one segment anterior by comparison with *marenzelleri*, and the origin of the typhlosole that occurs in segment 24. However, a large variation in the body size, the location of setae, papillae and genital glands (Ljungström & Reinecke 1969; Plisko 2000) can also be observed in *modestus*. Similarly, both species occur in a wide range of biotopes, including both undisturbed and cultivated lands, and near human habitations. They have wide geographical distribution, and can readily adapt to various environmental conditions. The variability in some external features versus the constant state of other specific characters, might indicate adaptations to variable conditions, allowing both species to achieve broad ecological and geographical dispersal. The remarkably broad distribution of *marenzelleri* recorded in Western Cape and extended through Eastern Cape, is from just above sea level near Knysna, to King William's Town and Umtata, Barkly Pass at the Drakensberg foothills, and then to Ficksburg and Fouriesburg in Free State. It can be also compared to the range of *modestus,* which was collected at numerous sites in North West, Free State, Eastern Cape, KZN and Mpumalanga provinces.

ACKNOWLEDGEMENTS

I wish to thank Mr L. Maphasa, Director of the Natal Museum for his support in my extended studies on South African endemic earthworms. Special thanks are going to Dr H. Sattmann from Natural History Museum in Vienna and Dr H. Dastych from Zoological Museum, University of Hamburg, for their kind assistance when studying type material. I am also grateful to Prof. A. Zicsi from the Lorand-Eötvös University in Budapest, and Dr B.R. Stuckenberg, Director *emeritus* of the Natal Museum, for their assistance in collecting material and profitable comments on this paper. I would particularly like to thank Dr M. Mostovski, Head of the Arthropoda Department, Natal Museum, for his professional assistance in the preparation of this paper. Special thanks also go to Mrs C. Conway who provided the map. I also thank Mr M. Taylor and Mr G. Elliott for their editorial help and professional setup of the paper.

REFERENCES

Ljungström, P.O. & Reinecke, A.J. 1969. Variations in the morphology of *Microchaetus modestus* (Microchaetidae, Oligochaeta) from South Africa, with notes on its biology. *Zoologischer Anzeiger* **182**: 216–224.

Michaelsen, W. 1899*a*. Terricolen von verschiedenen Gebieten der Erde. *Mitteilungen aus dem Naturhistorischen Museum in Hamburg* **16**: 1–122.

———1899*b*. Revision der Kinberg'schen Oligochaeten-Typen. *Kongliga Vetenskaps-Akademiens Förhandlingar Stockholm* **56**: 413–448.

———1900. Oligochaeta. *Das Tierreich* **10**: i–xxix + 1–575.

———1910–1912. Die terrestrischen Oligochaeten des tropischen Afrikas und ihre geographischen Beziehungen. *Wissenschaftliche Ergebnisse der Deutchen Zentral-Afrika Expedition 1907–1908.* Leipzig: Klinkhardt & Biermann. **3**: 1–90.

———1913. Die Oligochaeten des Kaplandes. *Zoologische Jahrbücher, Abteilung für Systematik* **34**: 473–556.

———1918. Die Lumbriciden mit besonderer Berücksichtingung der bisher als Familie Glossoscolecidae zusammengefassten Unterfamilien. *Zoologische Jahrbücher, Abteilung für Systematik* **41**: 1–398.

Pickford, G.E. 1975. Contributions to a study of South African Microchaetinae (Annelida: Oligochaeta). *Transactions of the Connecticut Academy of Arts and Science* **46**: 13–76.

Plisko, J.D. 1992. The Microchaetidae of Natal, with description of new species of *Microchaetus* Rapp and *Tritogenia* Kinberg, and the new genus *Proandricus* (Oligochaeta). *Annals of the Natal Museum* **33**: 337–378.

———1993. Eight new species of *Proandricus* Plisko, 1992 from South Africa (Oligochaeta: Microchaetidae). *Annals of the Natal Museum* **34** (2): 199–220.

———1996. Six new earthworm species of the southern African genus *Proandricus* Plisko, 1992 (Oligochaeta: Microchaetidae). *Annals of the Natal Museum* **37**: 295–307.

———2000. A new arrangement of species-groups in the genus *Proandricus* Plisko, 1992, with description of four new species and notes on some previously known species (Oligochaeta: Microchaetidae). *Annals of the Natal Museum* **41**: 237–262.

———2002. Nine new earthworm species of *Proandricus* Plisko, 1992 from South Africa and Lesotho (Oligochaeta: Microchaetidae). *African Invertebrates* **43**: 183–203.

———2003. Eleven new South African earthworms (Oligochaeta: Microchaetidae) with new information on some known species, and an inventory of the microchaetids of KwaZulu-Natal. *African Invertebrates* **43** (2): 279–325.

Reynolds, J.W. & Cook, D.G. 1976. *Nomenclatura Oligochaetologica. A catalogue of names, descriptions and type specimens of the Oligochaeta*. Ottawa: Runge Press.

Rosa, D. 1897. Osservazioni su due nuove Microchete. *Bolletino dei Musei di Zoologia ed Anatomia comparata della R. Universita di Torino* **12** (310): 1–4.

Sciacchitano, I. 1960. Oligochaeta part. *In*: Hanström, B., Brinck, P., & Rudebeck, G., eds, *South African animal life: results of the Lund University Expedition in 1950–1951.* Uppsala: Almqvist & Wiksells. **7**: 9–12.